

FIRST OBSERVATION OF EXCITED STATES IN THE $T = -1$, ODD-ODD NUCLEUS ^{48}Mn

C. Chandler¹, M.A. Bentley¹, M.P. Carpenter², C.N. Davids², R. Du Rietz³, J. Ekman³, S.J. Freeman^{4,2}, P.E. Garrett⁵, G. Hammond¹, R.V.F. Janssens² and D. Seweryniak²

¹ *School of Chemistry and Physics, Keele University, Keele, Staffordshire, ST5 5BG, UK*

² *Physics Division, Argonne National Laboratory, Argonne, Chicago, IL 60439, USA*

³ *Department of Physics, Lund University, S-22100 Lund, Sweden*

⁴ *Department of Physics and Astronomy, University of Manchester, Manchester, M13 9PL, UK*

⁵ *Lawrence Livermore National Laboratory, Livermore, CA 94551, USA*

The Coulomb Energy Differences of mirror nuclei are now well understood in terms of the spatial correlations of the $f_{7/2}$ shell valence particles, in particular the alignment of a pair of protons. To date, however, most studies have been restricted to $T = \frac{1}{2}$ mirror pairs. More recently though, advances in technology have allowed the study of nuclei with increasingly exotic values of isospin such as the $T = 1$ pairs $^{46}\text{Cr}/^{46}\text{Ti}$ and $^{50}\text{Fe}/^{50}\text{Cr}$. The CED can again be understood in terms of a pp alignment but in both cases of $T = \frac{1}{2}$ and $T = 1$ nuclei the CED show anomalous behaviour at low spin which cannot be attributed to alignment effects. The study of the $T = 1$ mirror pair $^{48}\text{Mn}/^{48}\text{V}$ may be of particular importance since they are odd-odd and therefore the first particle alignments are blocked and the CED may give a clearer insight into the behaviour at low spin.

In a recent experiment at the Argonne National Laboratory, ^{48}Mn was produced in the inverse reaction $^{40}\text{Ca} + ^{10}\text{B}$ at an energy of 110 MeV. Gamma rays were detected in the Gammasphere array and recoils were selected by the Fragment Mass Analyser and subsequently identified by Z in an ion chamber. A preliminary analysis shows a sequence of γ rays in coincidence with $Z=25$ (Mn) recoils which may be attributed to ^{48}Mn , representing the first observation of γ decays in this nucleus. Further confirmation of identification is obtained when the energies are compared with those of ^{48}V , its mirror partner. From this, a tentative level scheme has been built almost up to the expected band termination at 15^+ . A very intriguing CED analysis will be presented.